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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,461	07/17/2003	Takeshi Misawa	0649-0901P	9184

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EXAMINER

MAGEE, THOMAS J

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

12

Office Action Summary	Application No. 10/620,461	Applicant(s) MISAWA, TAKESHI	
	Examiner Thomas J. Magee	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>07172003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 8 is objected to on the basis of a minor informality. The phrase, "*on the rear surface*" is not definitive. It is not clear whether Applicant is referring to the rear surface of the wiring board or the rear surface of the semiconductor substrate. Examiner assumes that this may have been a typographical omission and that Applicant meant to recite, "rear surface of the semiconductor substrate." Nonetheless, correction is required.

Claim Rejections – 35 U.S.C. 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 – 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. (US 6,168,965 B1) in view of Lukianowicz et al. ("Optical System for Measurement of Surface Form and Roughness," Measurement Science Review, Vol. 1, No. 1, (2001) pp. 151 – 154).

4. Regarding Claims 1 and 3, Malinovich et al. disclose a semiconductor device comprising a semiconductor substrate (300) (Figure 4(A)) on which a photoelectric converting portion (100) is formed (CCD, CMOS image sensors) (Col. 1, lines 10 – 19) (Col. 11, lines 5 – 9),

wherein a package includes an area (Col. 4, lines 61 – 67) that is used to diffuse or partially transmit light. Malinovich et al. additionally disclose (Col. 6, lines 58 – 67) that the entire semiconductor back surface is roughed to create a zone completely over the photoelectric converting portion.

Malinovich et al. do not disclose the scattering properties of the surface to create a “light shading” (or diffuse) region. However, Lukianowicz et al. disclose (Figure 4, p.153) the distribution of scatter intensity from a “ground” surface, and the subsequent diffuse angular intensity in the beam after scatter from the rough surface features. It would then have been obvious to one of ordinary skill in the art at the time of the invention to combine Lukianowicz et al. with Malinovich et al. to obtain an optical device with a “light shading” or diffuse scattering layer to avoid spurious signals in the sensor.

5. Regarding Claim 2, Malinovich et al. disclose (Col. 8, lines 4 – 12) that the package comprises a wiring board (printed circuit board) with a connecting terminal on the rear surface.

6. Claims 4, 5, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Lukianowicz et al., as applied to Claims 1 – 3, and further in view of Wheatley et al. (US 5,122,905).

7. Regarding Claims 4 and 5, Malinovich et al. do not disclose the presence of one or more “light shading films having different refractive indices and formed on the rear surface of the substrate, corresponding to the photoelectric converting portion. Wheatley et al. disclose a

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multilayered film body (Figure 2) in which the refractive index difference between the first two layers is 0.03, and arranged such that at least 30% of the incident light is reflected, producing a diffuse or shaded surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the multifilm structure of Wheatley et al. at the back surface of the device of Malinovich et al. to produce a device with a diffuse or light shaded region at the rear of the device within regions of the photo electric converting portion to avoid spurious signals in the sensor.

8. Regarding Claim 8, as discussed above, Malinovich et al. do not disclose the presence of a light shading layer at the rear surface of the semiconductor substrate. Wheatley et al. disclose a layer structure at the rear surface (Col. 2, lines 22 – 47) that functions as a “light shading” (diffuse) layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Wheatley et al. with Malinovich et al. to obtain a diffuser (light shading) layer at the rear surface of the device to reduce spurious coupling into the sensor.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Lukianowicz et al., as applied to Claims 1 – 3, and further in view of Oxman et al. (US 6,395,124 B1).

10. Regarding Claim 6, Malinovich et al. do not disclose that the wiring board is connected to

the substrate through a light-shading resin material. Oxman et al. disclose (Col. 1, lines 20

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- 24, that a photopolymerizable resin adhesive can be used to attach a substrate to a circuit board (Figure 26) (26), wherein the cured epoxy acts as a “diffuser” or “light shading” region at the rear surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Oxman et al. with Malinovich et al. to obtain a resin adhesive material to attach the substrate and circuit board together.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Lukianowicz et al., as applied to Claims 1 – 3, and further in view of Tamaki (US 5,523,174).

12. Regarding Claim 7, Malinovich et al. do not disclose that the surface of the wiring board is roughened. Tamaki discloses (Figure 2) that the surface of the printed circuit board is roughened to improve adhesion at the surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tamaki et al. with Malinovich et al. to obtain an increased bonding at the interface of the board and the substrate.

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al.

14. Regarding Claim 9, Malinovich et al. disclose a method for manufacturing a semiconductor device comprising forming a plurality of devices (Col. 6, lines 5 – 7) (Figure 3A) (100) on the front surface of a semiconductor substrate, grinding the rear surface of the semiconductor substrate (Col. 4, lines 61 – 67), followed by a bonding step for bonding a wiring board on the rear surface of the substrate (Col. 8, lines 8 – 12) and a separating step for separating individual devices (Col. 7, lines 20 – 25) (Figure 4D).

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malinovich et al. in view of Oxman et al.

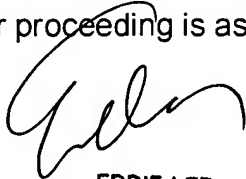
16. Regarding Claim 10, Malinovich et al. disclose a method for manufacturing a semiconductor device comprising the steps of forming a plurality of devices (Col. 6, lines 5 –7) (Figure 3A) (100) on the front surface of a semiconductor substrate, and a separating step for separating individual devices (Col. 7, lines 20 – 25) (Figure 4D).

Malinovich et al. do not disclose the use of a light shading adhesive for bonding a wiring board on the rear surface of a semiconductor device. Oxman et al. disclose (Col. 1, lines 20 - 24, that a photopolymerizable resin adhesive can be used to attach a substrate to a circuit board (Figure 26) (26), wherein the cured epoxy acts as a “diffuser” or “light shading” region at the rear surface. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Oxman et al. with Malinovich et al. to obtain a resin adhesive material to attach the substrate and circuit board together.

Conclusions

17. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to **Thomas Magee**, whose telephone number is **(703) 305 5396**. The Examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM (EST). If attempts to reach the Examiner by telephone are unsuccessful, the examiner’s supervisor, **Eddie Lee**, can be reached on **(703) 308-1690**. The fax number for the organization where this application or proceeding is assigned is **(703)**

872-9306.
Thomas Magee
January 14, 2004


EDDIE LEE
SUPERVISORY PATENT EXAMINER
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